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Department of Energy  
Richland Operations Office  
P.O. Box 550  
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AUG 22 1996

Mr. Steve M. Alexander  
Perimeter Areas Section Manager  
Nuclear Waste Program  
State of Washington  
Department of Ecology  
1315 W. Fourth Avenue  
Kennewick, Washington 99336-6018

Mr. Douglas R. Sherwood  
Hanford Project Manager  
U.S. Environmental Protection Agency  
712 Swift Boulevard, Suite 5  
Richland, Washington 99352-0539



Dear Messrs. Alexander and Sherwood:

EXPLANATION OF SIGNIFICANT DIFFERENCE (ESD) FOR THE INTERIM REMEDIAL ACTION  
RECORD OF DECISION (ROD) FOR THE 100-BC-1, 100-DR-1, 100-HR-1 OPERABLE UNITS,  
HANFORD SITE, BENTON COUNTY, WASHINGTON, DRAFT B

Enclosed please find five copies of the subject document. This ESD will add  
34 sites to the existing 100 Area ROD which was issued in September 1995.

Please review this document in preparation for an upcoming meeting to discuss  
and disposition all comments. The meeting will be held on August 26, 1996, at  
3350 George Washington Way, Conference Room 2C58, from 1:00 p.m. to 4:00 p.m.

If you want to discuss this matter further or require additional information,  
please contact me at 376-9552.

Sincerely,

A handwritten signature in black ink is located below the "Sincerely," text. The signature appears to read "Glenn I. Goldberg".

Glenn I. Goldberg, Project Manager  
Remedial Actions Project

RAP:GIG

Enclosure

cc w/encl:  
C. E. Corriveau, BHI  
J. W. Donnelly, Ecology  
D. A. Faulk, EPA  
K. K. Holliday, Ecology  
J. R. James, BHI  
K. J. Oates, EPA

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 10, HANFORD PROJECT OFFICE**

712 Swift Boulevard, Suite 5  
Richland, Washington

**Explanation of Significant Difference for the Interim Remedial Action Record of Decision for the 100-BC-1, 100-DR-1, 100-HR-1 Operable Units, Hanford Site, Benton County, Washington**

**1. Introduction**

This document presents an Explanation of Significant Difference (ESD) for the Interim Remedial Action Record of Decision (ROD) for the 100-BC-1, 100-DR-1, 100-HR-1 Operable Units at the Hanford Site.

**Site Name and Location**

100 Area National Priorities List (NPL) Site, Hanford Federal Facility, Richland, Washington

**Lead and Support Agencies**

The lead agency for this action is the U.S. Environmental Protection Agency (EPA). The U.S. Department of Energy (DOE) and the Washington Department of Ecology (Ecology) both concur with the need and justification to change the number of waste sites to be remediated, authorize additional waste disposal in ERDF, and reduce the cost estimates for this project. The three agencies participated jointly in the decision and preparation of this document.

**Statutory Citation for an ESD**

The Interim Remedial Action ROD was signed by the EPA, Ecology, and the DOE in September 1995. The Interim Remedial Action ROD is pursuant to the provisions of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Hanford Federal Facility Agreement and Consent Order (Tri-Party Agreement) of May 1989. This ESD is prepared in accordance with Section 117(c) of CERCLA and 40 CFR 300.435(c)(2)(i).

**Need for the ESD**

This ESD is necessary for the following reasons:

- The scope of the remedial action has been expanded to include 34 additional sites within the 100 Area which received similar or identical discharges of radioactive liquid effluent as the original 37 high priority waste sites presented for remediation in the Interim Remedial Action ROD. The additional sites are in the 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-1, 100-HR-1, 100-KR-1, and 100-KR-2 Operable Units.

- Investigation derived waste (IDW) generated during site assessment activities has been temporarily stored throughout the 100 Area. All 100 Area IDW will be transported to the Hanford central plateau for disposal in the Environmental Restoration Disposal Facility (ERDF).
- During remedial design for the original 37 sites significant opportunities for streamlining and coordination of remediation activities were identified. These, and lessons learned from demonstration projects and an expedited response action, resulted in reductions to cost estimates for remediation of 100 Area waste sites. Preliminary cost estimates for the 37 radioactive liquid waste sites in the Interim Remedial Action ROD totalled \$491 million. The current cost estimate for remediation of the same 37 waste sites is \$64 million.

### Administrative Record

This ESD will become part of the Administrative Record for Hanford Environmental Restoration Disposal Facility, as required by 40 CFR 300.825(a)(2), and will be available to the public at the following locations:

#### ADMINISTRATIVE RECORD (Contains all project documents)

U.S. Department of Energy  
Richland Operations Office  
Administrative Record Center  
2440 Stevens Center  
Richland, Washington 99352

EPA Region 10  
Superfund Record Center  
1200 Sixth Avenue  
Park Place Building, 7th Floor  
Seattle, Washington 98101

Washington State Department of Ecology  
Administrative Record  
719 Sleater-Kinney Road SE  
Capital Financial Building, Suite 200  
Lacey, Washington 98503-1138

#### INFORMATION REPOSITORIES (Contain limited documentation)

University of Washington  
Suzzallo Library  
Government Publications Room  
Mail Stop FM-25  
Seattle, Washington 98195

Gonzaga University  
Foley Center  
E. 502 Boone  
Spokane, Washington 99258

Portland State University  
Branford Price Millar Library  
Science and Engineering Floor  
SW Harrison and Park  
P.O. Box 1151  
Portland, Oregon 97207

DOE Richland Public Reading Room  
Washington State University, Tri-Cities  
100 Sprout Road, Room 130  
Richland, Washington 99352

The notice of the availability of the ESD was published in the *Hood River News*, the *Seattle Times P/I*, the *Spokesman Review-Chronicle*, the *Tri-City Herald*, and the *Oregonian* on XXXXX, XXX.

## **2. Summary of Site History, Contamination Problems, and Selected Remedy**

The Hanford 100 Area lies at the north end of the Hanford Site in Benton County, Washington state, along the southern shoreline of the Columbia River as shown in Figure 1. The 100 Area NPL Site is comprised of six non-contiguous reactor areas containing the nine retired plutonium production reactors and their ancillary facilities. Large amounts of cooling water flowed through the reactor cores and became contaminated with radionuclides and other waste. Soil and underlying groundwater were contaminated when cooling water was disposed in cribs and trenches, and leaked from water transfer systems. Solid wastes contaminated with radionuclides were buried in unlined trenches.

An Interim Remedial Action ROD was declared at the Hanford Site in September 1995 for the 100-BC-1, 100-DR-1, and 100-HR-1 Operable Units to address actual or threatened releases at radioactive effluent disposal sites. The Interim Remedial Action identified 37 high-priority waste sites which had received liquid radioactive effluent discharges. The selected interim remedy for the 37 sites is to remove, treat as appropriate or required, and dispose of the waste.

The selected remedy relies on the Plug-In Approach for selection of the same remedy at multiple similar or "analogous" sites within the 100 Area. A standard remedy is selected that applies to a given set of circumstances rather than to a specific waste site. The approach combines historical information on former process operations with limited field investigation information of the nature and extent of contamination to determine the analogous nature of individual waste sites. This allows the EPA, Ecology, and DOE to select and implement remedial actions at similar

waste sites without expending resources to further characterize analogous sites across the 100 Area.

The remedy will be implemented as follows:

- Remove contaminated soil, structures and debris from 100 Area source waste sites using the "Observational Approach." The Observational Approach utilizes analytical screening during remediation to guide the extent of excavation. Remediation proceeds until it can be demonstrated through a combination of field screening and confirmational sampling that cleanup goals have been achieved.
- Treat the waste as required to meet applicable waste disposal criteria.
- Dispose of contaminated materials at ERDF
- Backfill excavated areas and revegetate.

The extent of remediation of the waste sites will take into account appropriate site-specific factors including practicability of remediation, remediation costs, worker safety, sizing of the ERDF, and protection of human health and the environment during remediation. The DOE will control access and use of the Hanford Site for the duration of the cleanup. Institutional controls and long term monitoring will be required for sites where wastes are left in place. Wastes will continue to be present in the 100 Area until final remediation objectives are achieved and a final Record of Decision is issued.

### **3. Description of Significant Differences and the Basis for those Differences**

The significant differences from the Interim Remedial Action ROD for the original 37 high priority sites are identified and explained in the following sections.

#### **Additional Radioactive Liquid Source Waste Sites**

Additional radioactive liquid source waste sites exist at the 100 Area NPL Site that are analogous to those in the 100-BC-1, 100-DR-1, and 100-HR-1 Operable Units selected for the Interim Remedial Action ROD. The boundaries of the remedial action have been expanded to include 34 additional sites within the 100 Area which received similar or identical discharges of radioactive liquid effluent as the original 37 high priority waste sites of the Interim Remedial Action ROD. It was concluded that the 34 additional sites warrant interim remedial action based on the Plug-In Approach because they all received similar historical discharges of liquid radioactive effluent and the limited available field investigation results indicate elevated risk levels comparable to that of the original 37 high priority sites.

Information concerning the additional sites in the 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-1, 100-HR-1, 100-KR-1, and 100-KR-2 Operable Units is summarized in Table 1. An analogous

site for each of the 34 additional sites is presented from the list of 37 high priority sites included in the Interim Remedial Action ROD.

Table 2 presents information on waste site profiles for the additional 34 radioactive liquid waste sites; including volumes, nominal site dimensions, anticipated or known contaminants and estimated remediation costs. Estimated remediation costs for the 34 additional 100 Area radioactive liquid waste sites total \$80 million.

#### **Investigation Derived Waste**

Investigation derived waste consisting of contaminated soil and miscellaneous debris has been stored at the locations of prior intrusive investigation of waste sites throughout the 100 Areas. Limited field investigations produced contaminated soil and low-level waste which is comparable to wastes determined in the Interim Remedial Action ROD to be appropriate for disposal in ERDF. Therefore, this waste material is to be disposed in ERDF.

#### **Reductions to Cost Estimates for Remediation of 100 Area Waste Sites**

The EPA, Ecology, and DOE identified significant opportunities for streamlining and coordination of remediation activities during remedial design for the original 37 waste sites. An Expedited Response Action (ERA) was conducted in the 100-BC-1 Operable Unit to address uncertainties in remedial design planning and to initiate remedial action on 100 Area source waste sites. Lessons learned from this ERA, revised cost modeling assumptions, and a re-evaluation of site specific analytical data resulted in more accurate development of cost estimates and reductions to cost estimates for remediation of 100 Area waste sites. It was determined that less material will need to be removed during remediation than originally planned, that significantly fewer samples and analyses will be needed for confirmation of cleanup, and that disposal costs will be significantly lower than originally anticipated.

The preliminary cost estimate for the selected interim remedial action (remove, treat as appropriate or required, and dispose) for the original 37 sites was \$491 million. Use of less conservative assumptions and refining of the data inputs to the cost estimating model software has reduced this estimate to \$64 million. Remediation costs for the total 71 radioactive liquid waste sites of the Interim Remedial Action ROD and this ESD are projected to be \$144 million.

#### **4. Support Agency Comments**

The EPA and Ecology, in a joint letter dated February 8, 1996, entitled "100 Area Record of Decision Strategy," recommended an ESD to address all remaining 100 Area radioactive liquid effluent disposal sites. The agencies continue to emphasize streamlining the administrative process for cleanup of waste sites and shifting resources from the assessment phase to the remediation phase.

## 5. Affirmation of the Statutory Determinations

Considering the new information that has been developed and the broadening of the scope of cleanup activities, the EPA and Ecology believe that the selected remedy (remove, treat as appropriate or required, and dispose) remains protective of human health and the environment, complies with Federal and State requirements that are applicable or relevant and appropriate to this remedial action, and is cost-effective. The addition of 34 analogous sites to the original 37 high priority radioactive liquid waste sites selected for remediation in the Interim Remedial Action ROD does not change the applicability of statutory requirements. The remediation project will continue to utilize permanent solutions to the maximum extent practicable for 100 Area source waste sites.

Inclusion of IDW from 100 Area investigations for disposal in the ERDF is consistent with the intent of the Interim Remedial Action ROD to facilitate disposal of contaminated materials at the ERDF.

### Attachments:

Figure 1: Map of the Hanford Site Showing the Reactors in the 100 Area and ERDF

Table 1: Thirty-Four Additional 100 Area Radioactive Liquid Waste Sites for Remediation.

Table 2: Waste Site Profiles for 34 Additional 100 Area Radioactive Liquid Waste Sites.

DRAFT B - AUGUST 15, 1996

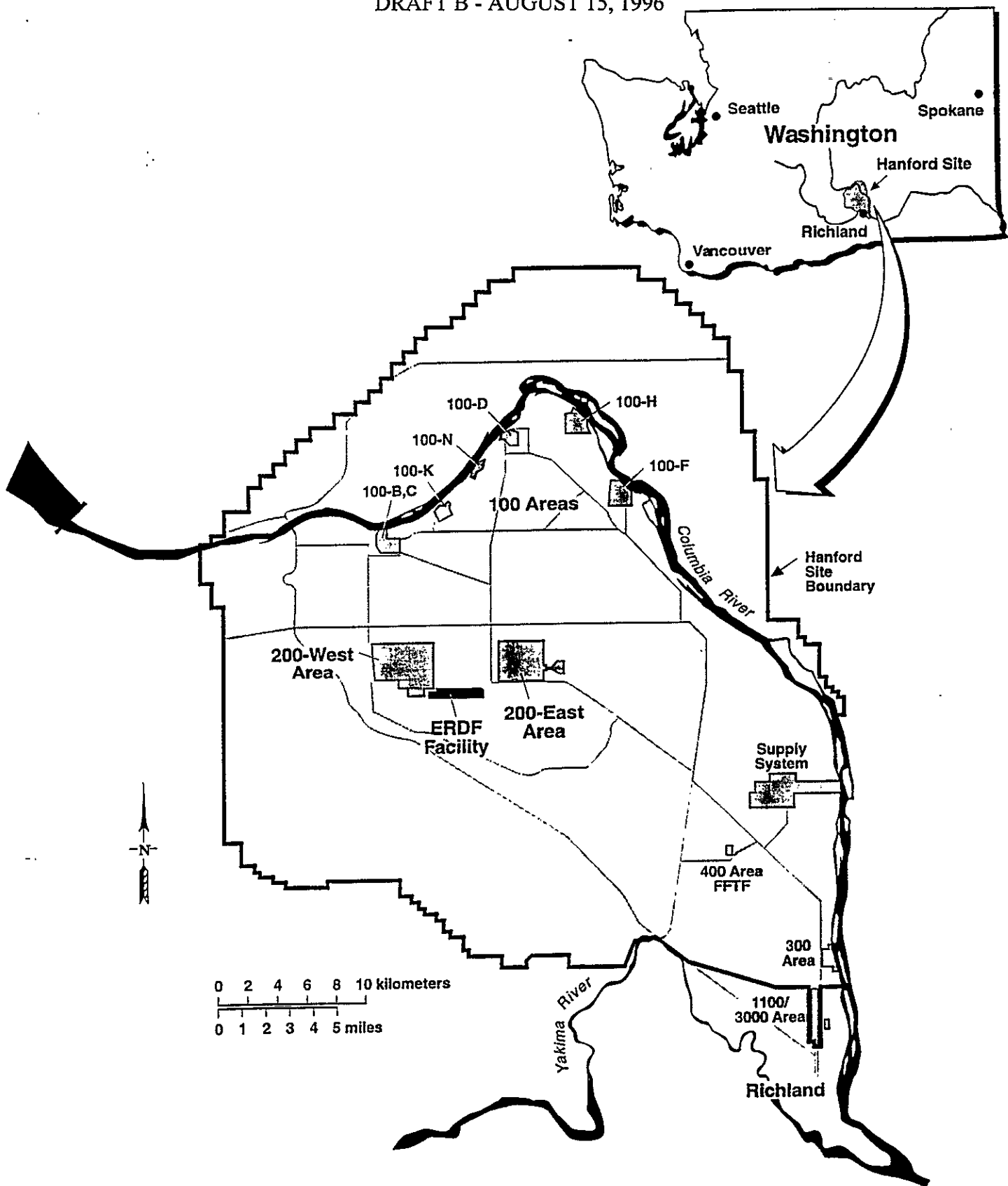


Figure 1: Map of The Hanford Site Showing the Reactors in the 100 Area and ERDF



**Table 1: Thirty-Four Additional 100 Area Radioactive Liquid Waste Sites**

Site Name	References	Current Site Knowledge	Analogous Sites *
<b>Additional 100-BC Area Radioactive Liquid Waste Sites</b>			
116-C-2A Pluto Crib	Sect. 5.1 of 100-B Technical Baseline (WHC-SD-EN-TI- 220, Rev. 0)	This site received effluent from the 116-C-2C Pluto Crib Sand Filter. The site is an unlined earthen structure 6.9 m by 4.7 m by 1.5 m deep that is covered by 5.7 m of non-contaminated soil fill.	116-B-3 Pluto Crib
116-C-2C Pluto Crib Sand Filter	Sect. 5.3 of 100-B Technical Baseline (WHC-SD-EN-TI- 220, Rev. 0)	This site received cooling water contaminated by fuel cladding failures and other C Reactor effluents. The site is an open bottomed concrete box 12.7 m by 5.5 m by 5.6 m deep.	116-B-3 Pluto Crib
<b>Additional 100-D Area Radioactive Liquid Waste Sites</b>			
116-D-3 French Drain (108-D Crib #1)	Sect. 4.4 of 100-D Technical Baseline (WHC-SD-EN-TI- 181, Rev. 0)	This site received effluent containing radioactive waste and hazardous chemicals from the contaminated 108-D Maintenance Shop and Cask Decontamination Pad that operated from 1951 to 1967. The site is a crib 0.9 m in diameter by 1.5 m deep located directly east of the 108-D building.	116-B-4 French Drain
116-DR-3 Storage Basin Trench	Sect. 5.2 of 100-D Technical Baseline (WHC-SD-EN-TI- 181, Rev. 0)	This site received 4 million liters of contaminated sludge and water removed from the 105-DR Fuel Storage Basin in 1955. The site is an unlined trench 18 m by 12 m by 3.1 m deep.	116-D-1A Fuel Storage Basin Trench
116-DR-4 Pluto Crib	Sect. 5.3 of 100-D Technical Baseline (WHC-SD-EN-TI- 181, Rev. 0)	This site received 4,000 liters of reactor cooling water from DR Reactor process tubes containing ruptured fuel elements. The site is an unlined trench 3.1 m by 3.1 m by 3.1 m deep.	116-D-2A Pluto Crib
116-DR-6 Liquid Disposal Trench	Sect. 5.4 of 100-D Technical Baseline (WHC-SD-EN-TI- 181, Rev. 0)	This site received reactor cooling water during effluent system maintenance and the Ball 3X upgrade. The site is a lined trench 15.2 m by 3.1 m by 3.1 m deep.	116-DR-1 Process Effluent Disposal Trench
<b>Additional 100-F Area Radioactive Liquid Waste Sites</b>			
UPR-100-F-2 Unplanned Release - Basin Leak Ditch	Sect. 4.28 of 100-F Technical Baseline (WHC-SD-EN-TI- 169, Rev. 0)	This site is a ditch formed by overflow of the north end of the 107-F Retention Basin during 1955 and enlarged by repeated overflows from an effluent line manhole north of the basin. Contaminants include elevated concentrations of Co-60, Cs-137, and Eu-152 reported in soil along the path of the ditch.	116-B-1 Process Effluent Disposal Trench
100-F-19 Process Effluent Pipelines	Sect. 4.38 of 100-F Technical Baseline (WHC-SD-EN-TI- 169, Rev. 0)	These pipelines carried process effluent from the F Reactor to the retention basins and from the retention basins to the outfall structure. This site includes only the process effluent pipelines and does not include the process sewer pipelines or any other pipelines.	100-BC Process Effluent Pipelines

**Table 1: Thirty-Four Additional 100 Area Radioactive Liquid Waste Sites**

Site Name	References	Current Site Knowledge	Analogous Sites <sup>a</sup>
108-F French Drain (100-F-15)	Sect. 4.29 of 100-F Technical Baseline (WHC-SD-EN-TI-169, Rev. 0)	This site is located adjacent to the east wall of the 108-F building and received condensate from hoods inside the 108-F biology laboratory. The site consists of a French drain 1.2 m in diameter that extends to an unknown depth.	116-B-4 French Drain
116-F-1 Process Effluent Disposal Trench (Lewis Canal)	Sect. 4.1 of 100-F Technical Baseline (WHC-SD-EN-TI-169, Rev. 0)	This site received approximately 100 million liters of liquid waste including process effluent from the F Reactor and 190-F building and decontamination wastes from the 189-F building during operations from 1953 to 1965. The site is an unlined trench that is 914 m by 12 m by 3 m deep.	116-B-1 Process Effluent Disposal Trench
116-F-2 Process Effluent Disposal Trench (107-F)	Sect. 4.2 of 100-F Technical Baseline (WHC-SD-EN-TI-169, Rev. 0)	This site received overflow from the 116-F-14 Retention Basin and the F Reactor Fuel Storage Basin from 1950 to 1965. The site consists of three unlined trenches connected together. The overflow trench is 180 m by 39 m by 5 m deep. The bypass ditch 116 m by 12 m by 5 m deep. The diversion ditch is 123 m by 12 m by 5 m deep.	116-B-1 Process Effluent Disposal Trench
116-F-3 Fuel Storage Basin Trench (105-F)	Sect. 4.3 of 100-F Technical Baseline (WHC-SD-EN-TI-169, Rev. 0)	This site received cooling water effluent and sludge from the F Reactor Fuel Storage Basin. The site is an unlined trench 30 m by 6.1 m by 2.4 m deep.	116-B-2 Fuel Storage Basin Trench
116-F-4 Pluto Crib	Sect. 4.4 of 100-F Technical Baseline (WHC-SD-EN-TI-169, Rev. 0)	This site received liquid waste from F Reactor when fuel cladding ruptures occurred from 1950 to 1952. The site was excavated and cleaned during 1993, as reported in DOE/RL-94-16. The contaminated material removed from the site is stored in an enclosure adjacent to the site.	116-B-3 Pluto Crib
116-F-5 Ball Washer Crib	Sect. 4.5 of 100-F Technical Baseline (WHC-SD-EN-TI-169, Rev. 0)	This site received decontamination wastes from the F Reactor ball washer assembly from 1962 to 1964. The site is a wooden structure located in the transfer basin area of the 105-F Reactor building and is approximately 4.6 m by 4.6 m by 3 m deep.	116-B-3 Pluto Crib
116-F-6 Liquid Waste Disposal Trench (1608-F)	Sect. 4.6 of 100-F Technical Baseline (WHC-SD-EN-TI-169, Rev. 0)	This site received process effluent diverted during F Reactor maintenance outages. This site is an unlined trench 91 m by 30.5 m by 3.1 m deep.	116-B-1 Process Effluent Disposal Trench
116-F-9 PNL Animal Waste Leach Trench	Sect. 4.9 of 100-F Technical Baseline (WHC-SD-EN-TI-169, Rev. 0)	This site received contaminated wash and waste water from animal pens, containing Sr-90 and Pu-239. The site is an unlined trench that consists of two trenches connected together. The long trench is 122 m by 5 m by 3 m deep. The short trench is 30 m by 5 m by 3 m deep.	116-B-1 Process Effluent Disposal Trench

**Table 1: Thirty-Four Additional 100 Area Radioactive Liquid Waste Sites**

Site Name	References	Current Site Knowledge	Analogous Sites <sup>a</sup>
116-F-10 French Drain (105-F)	Sect. 4.10 of 100-F Technical Baseline (WHC-SD-EN-TI- 169, Rev. 0)	This site received spent nitric acid and rinse water from the decontamination of fuel element spacers at F Reactor. The site consists of a French drain 1 m diameter by 2 m deep.	116-B-4 French Drain
116-F-11 Cushion Corridor French Drain	Sect. 4.11 of 100-F Technical Baseline (WHC-SD-EN-TI- 169, Rev. 0)	This site received about 200,000 liters of radioactive liquids from decontamination of F Reactor hardware during operations from 1953 to 1965. Releases to the drain percolated into the soil below the drain. The site consists of a 0.9 m diameter tile pipe with a metal lid located immediately adjacent to the reactor building.	116-B-4 French Drain
116-F-14 Retention Basin (107-F)	Sect. 4.14 of 100-F Technical Baseline (WHC-SD-EN-TI- 169, Rev. 0)	This site received essentially all of the cooling water effluent from F Reactor during its period of operation, from 1945 to 1965. The site consists of a reinforced rectangular concrete retention basin in an area of contaminated soil measuring approximately 415 m by 110 m by 7.3 m deep.	116-B-11 Retention Basin
126-F-1 Powerhouse Ash Pit	Sect. 5.9 of 100-F Technical Baseline (WHC-SD-EN-TI- 169, Rev. 0)	This site contains coal ash and soil that is radioactively contaminated due to leakage from the reactor effluent lines during the time period from 1944 to 1965. It is an irregular area approximately 335 m by 145 m by 6.1 m deep.	116-B-1 Process Effluent Disposal Trench
<b>Additional 100-H Area Radioactive Liquid Waste Sites</b>			
100-H-5 Sludge Burial Trench (107- H)	Sect. 4.22 of 100-H Technical Baseline (BHI-00127, Rev. 00)	This site contains sludge removed from the 116-H-7 Retention Basins in 1953. The site is located approximately 30.5 m east of the 107-H Retention Basin. The 45.7 m x 4.6 m x 4.6 m deep trench was covered to grade with 1.5 m fill. Currently the site appears as an open cobble field.	116-B-13 Sludge Trench
100-H-17 (116-H-2 Overflow Area)	Sect. 4.32 of 100-H Technical Baseline (BHI-00127, Rev. 00)	This site consists of a two acre tract immediately south of the 1608-H Liquid Waste Disposal Trench which was flooded with process effluent during 1953 when the trench overflowed. The area is bounded on the north by the trench and by railroad tracks on the east, west, and south. The site is stabilized with gravel and soil.	116-B-1 Process Effluent Disposal Trench
116-H-3 French Drain (105-H)	Sect. 4.3 of 100-H Technical Baseline (BHI-00127, Rev. 00)	This site received spent nitric acid and rinse water from decontamination of fuel spacers, process tube caps, and reactor hardware during operation from 1950 to 1965. The site consists of two 0.9 m diameter gravel filled clay pipes adjacent to the process effluent pipelines that are approximately 7 m apart. A wood cover is over one drain. The other drain not visible.	116-B-4 French Drain
<b>Additional 100-K Area Radioactive Liquid Waste Sites</b>			

**Table 1: Thirty-Four Additional 100 Area Radioactive Liquid Waste Sites**

Site Name	References	Current Site Knowledge	Analogous Sites *
100-KR-1 Process Effluent Pipelines	Sect. 4.4, 4.5 of 100-K Technical Baseline (WHC- SD-EN-TI-239, Rev. 0)	These pipelines transported reactor cooling water to the retention basins, 116-K-3 Outfall structure, 116-K-1 Crib, and 116-K-2 Trench. The pipelines contain contaminated sludge and scale. The pipelines are 183 cm, 168 cm, 152 cm, 107 cm, 91 cm, and 30 cm in diameter.	100-BC Process Effluent Pipelines
100-K-1 French Drain (South of 119- KW)	Sect. 5.38 of 100-K Technical Baseline (WHC- SD-EN-TI-239, Rev. 0)	This site received radioactive sampling effluent from the 119-KW Sample Building. The site consists of a French drain 0.3 m in diameter extending approximately 0.15 m above grade with the concrete painted blue. The site is located east of the 105-KW Reactor building between the stack and the 119-KW Exhaust Air Sample building.	116-B-4 French Drain
116-K-1 Crib	Sect. 4.1 of 100-K Technical Baseline (WHC-SD-EN-TI- 239, Rev. 0)	This site received 40 million liters of radioactive reactor cooling effluent wastes contaminated by fuel cladding ruptures. The site consists of a crib area 61 m by 61 m, surrounded by an earthen embankment extending 6.1 m above the crib bottom. The outer edge of the embankment encompasses an area 122 m by 122 m.	116-B-1 Process Effluent Disposal Trench
116-K-2 Process Effluent Trench	Sect. 4.2 of 100-K Technical Baseline (WHC-SD-EN-TI- 239, Rev. 0)	This site received approximately 300 billion liters of process effluent and contaminated water from floor drains in the 105-KE and 105-KW Reactor buildings. The site consists of a trench 1250 m by 13.7 m by 7.6 m deep which was backfilled in 1971. The first 290 m of the trench received 6.8 m of fill. The remainder of the trench received 6.6 m of fill. A construction tractor and all the "hydride" tanks from the 100-K Area are buried in the trench.	116-H-1 Process Effluent Disposal Trench
116-KE-1 Condensate Crib (115-KE)	Sect. 5.1 of 100-K Technical Baseline (WHC-SD-EN-TI- 239, Rev. 0)	This site received liquid condensate waste from the 115-KE Reactor Gas Purification System that operated from 1955 to 1971. The site consists of a crib with perforated pipe in a cobble-filled drain field 1.8 m by 1.8 m at the bottom, 12.2 m by 12.2 m at the top, and 7.9 m deep.	116-B-3 Pluto Crib
116-KE-2 Waste Crib (1706-KER)	Sect. 5.2 of 100-K Technical Baseline (WHC-SD-EN-TI- 239, Rev. 0)	This site received liquid waste from cleanup columns in the 1706-KER Reactor Effluent Test Loop that operated from 1955 to 1971. The site consists of a wooden crib structure 4.9 m by 4.9 m by 9.8 m deep within a pit filled with 3.1 m of gravel and backfilled to grade. The distribution pipe enters the pit at 7 m below grade.	116-B-3 Pluto Crib
116-KE-3 Fuel Storage Basin French Drain	Sect. 5.3 of 100-K Technical Baseline (WHC-SD-EN-TI- 239, Rev. 0)	This site received overflow from the 105-KE Reactor Fuel Storage Basin. The site consists of a 6.1 m diameter drainfield with a 0.2 m diameter perforated steel casing 23.8 m deep.	116-B-4 French Drain

**Table 1: Thirty-Four Additional 100 Area Radioactive Liquid Waste Sites**

Site Name	References	Current Site Knowledge	Analogous Sites <sup>a</sup>
116-KE-4 Retention Basins	Sect. 4.4 of 100-K Technical Baseline (WHC-SD-EN-TI-239, Rev. 0)	This site received process effluent from the 105-KE Reactor for cooling and decay before release to the Columbia River. The site formerly held open-topped welded carbon steel tanks 76.2 m diameter by 7.62 m high. Leakage contaminated the soil beneath the tanks. The tanks were removed during 1994-1995.	116-B-11 Retention Basin
116-KW-1 Condensate Crib (115-KW)	Sect. 5.9 of 100-K Technical Baseline (WHC-SD-EN-TI-239, Rev. 0)	This site received liquid condensate waste from the 115-KW Reactor Gas Purification System that operated from 1955 to 1970. The site consists of a crib with perforated pipe in a cobble-filled drain field 12.2 m by 12.2 m and 7.9 m deep.	116-B-3 Pluto Crib
116-KW-2 Storage Basin French Drain (105-KW)	Sect. 5.10 of 100-K Technical Baseline (WHC-SD-EN-TI-239, Rev. 0)	The site received overflow drainage from the 105-KW Fuel Storage Basin that operated from 1955 to 1970. The site consists of a French drain of a 6.1 m diameter drainfield with an 0.23 m diameter, 24 m (78 ft) deep reverse well with perforations in the bottom 6.1 m of the casing.	116-B-4 French Drain
116-KW-3 Retention Basins	Sect. 4.5 of 100-K Technical Baseline (WHC-SD-EN-TI-239, Rev. 0)	This site received process effluent from the 105-KW Reactor for cooling and radionuclide decay before being released to the Columbia River. The site formerly consisted of 3 open-topped welded carbon steel tanks 76.2 m diameter by 8.8 m high. The tanks were removed after leakage occurred in 1994-1995. The leakage contaminated the soil beneath the tanks.	116-B-11 Retention Basin

<sup>a</sup> Also see Table 6 of the Interim Remedial Action ROD (EPA 1995) for a more complete description of analogous sites in the 100-BC-1, 100-DR-1, and 100-HR-1 Operable Units.

**Table 2: Waste Site Profiles for 34 Additional 100 Area Radioactive Liquid Waste Sites**

Site Name	References	Extent of Contamination					Media/ Material	Known or Potential Contaminants of Concern	Estimated Cost for Remove/Treat/ Dispose <sup>a</sup>
		Contaminated Volume <sup>a</sup> m <sup>3</sup> (ft <sup>3</sup> )	Nominal Length <sup>b</sup> m (ft)	Nominal Width <sup>b</sup> m (ft)	Affected Area <sup>c</sup> m <sup>2</sup> (ft <sup>2</sup> )	Excavation Depth <sup>d</sup> m (ft)			
Additional 100-BC Area Radioactive Liquid Waste Sites									
116-C-2A Pluto Crib	Sect. 5.1 of 100-B Tech. Baseline (WHC- SD-EN-TI-220, Rev. 0)	852 (30085)	6.9 (22.25)	4.7 (15.3)	76.7 (817)	7.9 (26)	Timbers, Soil	C-14, Sr-90, Cadmium	\$3,328,280
116-C-2C Pluto Crib Sand Filter	Sect. 5.3 of 100-B Tech. Baseline (WHC- SD-EN-TI-220, Rev. 0)	533 (18821)	12.7 (41.5)	5.5 (18)	70 (745)	5.6 (18.25)	Concrete, Steel, Soil	Co-60, Sr-90, Cs-137, Eu-152, Pu-238, Pu-239/240	\$433,550
Additional 100-D Area Radioactive Liquid Waste Sites									
116-D-3 French Drain (108-D Crib #1)	Sect. 4.4 of 100-D Tech. Baseline (WHC- SD-EN-TI-181, Rev. 0)	20 (690)	0.9 (3)	0.9 (3)	0.85 (9)	3.4 (11)	Soil	Undetermined radionuclides	\$128,630
116-DR-3 Storage Basin Trench	Sect. 5.2 of 100-D Tech. Baseline (WHC- SD-EN-TI-181, Rev. 0)	840 (29673)	18.3 (60)	12.2 (40)	225 (2400)	3.1 (10)	Soil	Tritium, Co-60, Sr-90, Cs-137, Eu-152, Eu-154, Pu-238, Pu- 239/240	\$342,590
116-DR-4 Pluto Crib	Sect. 5.3 of 100-D Tech. Baseline (WHC- SD-EN-TI-181, Rev. 0)	122 (4320)	3.1 (10)	3.1 (10)	9.4 (100)	4.6 (15)	Timbers, Soil	Co-60, Sr-90, Cs-137, Eu-152, Eu-155, Pu-239/240	\$263,100
116-DR-6 Liquid Disposal Trench	Sect. 5.4 of 100-D Technical Baseline (WHC-SD-EN-TI- 181, Rev. 0)	375 (13257)	15.2 (50)	3.1 (10)	47 (500)	4.6 (15)	Soil	Undetermined radionuclides	\$172,690
Additional 100-F Area Radioactive Liquid Waste Sites									
UPR-100-F-2 Unplanned Release - Basin Leak Ditch	Sect. 4.28 of 100-F Tech. Baseline (WHC- SD-EN-TI-169, Rev. 0)	2053 (72500)	30 (100)	6.1 (20)	368 (3920)	4.6 (15)	Soil	Co-60, Sr-90, Cs-137, Eu-152	\$1,039,930
100-F-19 Buried Process Effluent Pipelines	Sect. 4.38 of 100-F Tech. Baseline (WHC- SD-EN-TI-169, Rev. 0)	21640 (764130)	(Various)	(Various)	(Various)	(Various)	Concrete, Steel, Soil	Co-60, Cs-137, Eu-152, Eu-155	\$3,766,905

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**Table 2: Waste Site Profiles for 34 Additional 100 Area Radioactive Liquid Waste Sites**

Site Name	References	Extent of Contamination					Media/ Material	Known or Potential Contaminants of Concern	Estimated Cost for Remove/Treat/ Dispose <sup>a</sup>
		Contaminated Volume <sup>a</sup> m <sup>3</sup> (ft <sup>3</sup> )	Nominal Length <sup>b</sup> m (ft)	Nominal Width <sup>b</sup> m (ft)	Affected Area <sup>c</sup> m <sup>2</sup> (ft <sup>2</sup> )	Excavation Depth <sup>d</sup> m (ft)			
108-F French Drain (100-F-15)	Sect. 4.29 of 100-F Technical Baseline (WHC-SD-EN-TI- 169, Rev. 0)	1 (35)	0.76 (2.5)	0.76 (2.5)	0.58 (6.25)	1.8 (6)	Concrete, Steel	K-40, Th-228, Pu-238, Pu-239/240	\$203,000
116-F-1 Process Effluent Disposal Trench (Lewis Canal)	Sect. 4.1 of 100-F Technical Baseline (WHC-SD-EN-TI- 169, Rev. 0)	3908 (137995)	914 (3000)	12.2 (40)	10994 (117100)	4.6 (15)	Soil	K-40, Co-60, Sr-90, Cs-137, Eu-152, Eu-154, Th-228, Arsenic Lead, Zinc	\$739,070
116-F-2 Process Effluent Disposal Trench (107-F)	Sect. 4.2 of 100-F Technical Baseline (WHC-SD-EN-TI- 169, Rev. 0)	1954 (69012)	180 (590)	34 (110)	5680 (60490)	4.6 (15)	Steel, Soil	C-14, K-40, Sr-90, Cs-137, Eu-152, Eu-154, Th-228, Chromium, Cadmium	\$520,900
116-F-3 Fuel Storage Basin Trench (105-F)	Sect. 4.3 of 100-F Technical Baseline (WHC-SD-EN-TI- 169, Rev. 0)	2345 (82809)	30 (100)	6.1 (20)	368 (3920)	4.6 (15)	Soil	K-40, Eu-152, Th-228, Barium, Chromium, Lead, Mercury	\$421,470
116-F-4 Pluto Crib	Sect. 4.4 of 100-F Tech. Baseline (WHC- SD-EN-TI-169, Rev. 0)	612 (21600)	3.1 (10)	3.1 (10)	9.4 (100)	4.6 (15)	Timbers, Soil	Tritium, Co-60, Sr-90, Cs-137, Eu-152, Eu-154, Eu-155, Pu- 238, Pu-239/240	\$196,370
116-F-5 Ball Washer Crib	Sect. 4.5 of 100-F Tech. Baseline (WHC- SD-EN-TI-169, Rev. 0)	924 (32616)	11 (35)	4.6 (15)	50 (540)	4.6 (15)	Concrete, Steel, Soil	Sr-90, Cs-137, Eu-154, Eu-155	\$436,180
116-F-6 Liquid Waste Disposal Trench (1608-F)	Sect. 4.6 of 100-F Technical Baseline (WHC-SD-EN-TI- 169, Rev. 0)	20957 (740016)	91.4 (300)	30.5 (100)	3600 (38340)	4.6 (15)	Soil	K-40, Co-60, Sr-90, Cs-137, Eu-152, Eu-154, Th-228, Chromium, Lead	\$2,279,650
116-F-9 PNL Animal Waste Leach Trench	Sect. 4.9 of 100-F Technical Baseline (WHC-SD-EN-TI- 169, Rev. 0)	10161 (358803)	150 (500)	4.6 (15)	3216 (34250)	4.6 (15)	Soil	C-14, K-40, Th-228	\$1,287,060
116-F-10 Dummy Decontamination French Drain (105- F)	Sect. 4.10 of 100-F Technical Baseline (WHC-SD-EN-TI- 169, Rev. 0)	2 (81)	1 (3)	1 (3)	1 (10)	4.6 (15)	Tile, Steel, Soil	Co-60, Sr-90, Cs-137, Eu-152, Eu-154, Eu-155, Pu-238, Pu-239/240	\$96,610

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**Table 2: Waste Site Profiles for 34 Additional 100 Area Radioactive Liquid Waste Sites**

Site Name	References	Extent of Contamination					Media/ Material	Known or Potential Contaminants of Concern	Estimated Cost for Remove/Treat/ Dispose <sup>a</sup>
		Contaminated Volume <sup>a</sup> m <sup>3</sup> (ft <sup>3</sup> )	Nominal Length <sup>b</sup> m (ft)	Nominal Width <sup>b</sup> m (ft)	Affected Area <sup>c</sup> m <sup>2</sup> (ft <sup>2</sup> )	Excavation Depth <sup>d</sup> m (ft)			
116-F-11 Cushion Corridor French Drain	Sect. 4.11 of 100-F Tech. Baseline (WHC- SD-EN-TI-169, Rev. 0)	70 (2484)	4.6 (15)	4.6 (15)	21 (225)	4.6 (15)	Tile, Steel, Soil	Tritium, Co-60, Sr-90, Cs-137, Eu-152, Eu-155, Pu-238, Pu- 239/240	\$145,180
116-F-14 Retention Basin (107-F)	Sect. 4.14 of 100-F Technical Baseline (WHC-SD-EN-TI- 169, Rev. 0)	38620 (1363480)	137 (450)	70 (230)	9590 (103500)	4.6 (15)	Concrete, Steel, Soil	Co-60, Sr-90, Cs-137, Eu-152, Eu-154, Th-228, Pu-239/240, Chromium, Cadmium	\$3,234,210
126-F-1 Powerhouse Ash Pit	Sect. 5.9 of 100-F Technical Baseline (WHC-SD-EN-TI- 169, Rev. 0)	221930 (7836561)	335 (1100)	145 (475)	53033 (570847)	6.1 (20)	Coal Ash, Soil	Co-60, Sr-90, Cs-137, Eu-152, Eu-154, Th-228, Chromium	\$37,072,670
<b>Additional 100-H Area Radioactive Liquid Waste Sites</b>									
100-H-5 Sludge Burial Trench (107-H)	Sect. 4.22 of 100-H Tech. Baseline (BHI- 00127, Rev. 00)	970 (34210)	45.7 (150)	4.6 (15)	211 (2250)	4.6 (15)	Soil	Co-60, Sr-90, Cs-137, Eu-152, Eu-154, Pu-238, Pu-239/240	\$313,300
100-H-17 (116-H-2 Overflow Area)	Sect. 4.32 of 100-H Tech. Baseline (BHI- 00127, Rev. 00)	20520 (724500)	89 (290)	89 (290)	7900 (84100)	4.6 (15)	Soil	Tritium, Co-60, Sr-90, Cs-137, Eu-152, Eu-154, Eu-155, Pu- 239/240, Chromium	\$2,114,510
116-H-3 Dummy Decontamination French Drain (105- H)	Sect. 4.3 of 100-H Tech. Baseline (BHI- 00127, Rev. 00)	180 (6320)	7.6 (25)	4.6 (15)	35 (375)	4.6 (15)	Tile, Steel, Soil	Tritium, Co-60, Sr-90, Cs-137, Eu-152, Eu-154, Pu-238, Pu- 239/240, Chromium	\$336,490
<b>Additional 100-K Area Radioactive Liquid Waste Sites</b>									
100-KR-1 Process Effluent Pipelines	Sect. 4.4, 4.5 of 100-K Tech. Baseline (WHC- SD-EN-TI-239, Rev. 0)	4620 (163080)	(Various)	(Various)	(Various)	(Various)	Concrete, Steel, Soil	Co-60, Sr-90, Cs-137, Eu-152, Eu-155	\$3,900,557
100-K-1 French Drain (South of 119-KW)	Sect. 5.38 of 100-K Tech. Baseline (WHC- SD-EN-TI-239, Rev. 0)	2443 (86265)	30.5 (100)	15.2 (50)	470 (5000)	4.6 (15)	Soil	Co-60, Sr-90, Cs-137, Eu-152, Eu-154, Pu-238, Pu-239/240	\$362,430

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Site Name	References	Extent of Contamination					Media/ Material	Known or Potential Contaminants of Concern	Estimated Cost for Remove/Treat/ Dispose <sup>a</sup>
		Contaminated Volume <sup>a</sup> m <sup>3</sup> (ft <sup>3</sup> )	Nominal Length <sup>b</sup> m (ft)	Nominal Width <sup>b</sup> m (ft)	Affected Area <sup>c</sup> m <sup>2</sup> (ft <sup>2</sup> )	Excavation Depth <sup>d</sup> m (ft)			
116-K-1 Crib	Sect. 4.1 of 100-K Technical Baseline (WHC-SD-EN-TI- 239, Rev. 0)	7820 (276180)	122 (400)	122 (400)	15024 (160000)	6.1 (20)	Soil	Co-60, Sr-90, Cs-137, Eu-152, Eu-154, Pu- 239/240	\$981,360
116-K-2 Process Effluent Trench	Sect. 4.2 of 100-K Technical Baseline (WHC-SD-EN-TI- 239, Rev. 0)	64980 (2294570)	1250 (4100)	13.7 (45)	17324 (184500)	4.6 (15)	Soil	Co-60, Sr-90, Eu-152, Eu-154, Th-228, Pu-239/240, Chromium, Mercury	\$8,053,110
116-KE-1 Condensate Crib (115-KE)	Sect. 5.1 of 100-K Technical Baseline (WHC-SD-EN-TI- 239, Rev. 0)	105 (3700)	12.2 (40)	12.2 (40)	150 (1600)	7.9 (26)	Concrete, Steel, Soil	Tritium, C-14	\$148,110
116-KE-2 Waste Crib (1706-KER)	Sect. 5.2 of 100-K Technical Baseline (WHC-SD-EN-TI- 239, Rev. 0)	294 (10370)	4.9 (16)	4.9 (16)	24 (256)	9.8 (32)	Timbers, Soil	Tritium, C-14	\$539,920
116-KE-3 Fuel Storage Basin French Drain	Sect. 5.3 of 100-K Technical Baseline (WHC-SD-EN-TI- 239, Rev. 0)	26 (918)	3.1 (10)	3.1 (10)	9.4 (100)	4.6 (15)	Steel, Soil	Co-60, Sr-90, Cs-137, Eu-152, Eu-155, Pu-239/240	\$149,800
116-KE-4 Retention Basins	Sect. 4.4 of 100-K Technical Baseline (WHC-SD-EN-TI- 239, Rev. 0)	36750 (1297620)	286 (940)	183 (600)	52338 (564000)	4.6 (15)	Concrete, Steel, Soil	Co-60, Sr-90, Eu-152, Eu-154, Th-228, Th-232, Pu-239/240, Chromium	\$3,138,440
116-KW-1 Condensate Crib (115-KW)	Sect. 5.9 of 100-K Technical Baseline (WHC-SD-EN-TI- 239, Rev. 0)	105 (3700)	12.2 (40)	12.2 (40)	150 (1600)	7.9 (26)	Concrete, Steel, Soil	Tritium, C-14, Co-60, Sr-90, Cs-137, Eu-154, Eu-155, U-238	\$148,110
116-KW-2 Fuel Storage Basin French Drain	Sect. 5.10 of 100-K Technical Baseline (WHC-SD-EN-TI- 239, Rev. 0)	26 (918)	3.1 (10)	3.1 (10)	9.4 (100)	4.6 (15)	Steel, Soil	Co-60, Sr-90, Cs-137, Eu-152, Eu-155, Pu-239/240	\$149,800

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**Table 2: Waste Site Profiles for 34 Additional 100 Area Radioactive Liquid Waste Sites**

Site Name	References	Extent of Contamination					Media/ Material	Known or Potential Contaminants of Concern	Estimated Cost for Remove/Treat/ Dispose <sup>a</sup>
		Contaminated Volume <sup>a</sup> m <sup>3</sup> (ft <sup>3</sup> )	Nominal Length <sup>b</sup> m (ft)	Nominal Width <sup>b</sup> m (ft)	Affected Area <sup>c</sup> m <sup>2</sup> (ft <sup>2</sup> )	Excavation Depth <sup>d</sup> m (ft)			
116-KW-3 Retention Basins	Sect. 4.5 of 100-K Technical Baseline (WHC-SD-EN-TI- 239, Rev. 0)	36690 (1295460)	286 (940)	183 (600)	52338 (564000)	4.6 (15)	Concrete, Steel, Soil	Co-60, Sr-90, Eu-152, Eu-154, Th-228, Th-232, Pu-239/240, Chromium	\$3,134,970
<b>Totals for 34 Additional 100 Area Radioactive Liquid Waste Sites</b>		503490 (17778726)	(N/A)	(N/A)	233353 (2505800)	(N/A)	(N/A)	(N/A)	\$79,727,062

<sup>a</sup>From Summary of MCACES Model Calculations, 1996 Baseline Project for ADS 3110, February, 1996. Please note that the calculation of contaminated volume takes into account the linear and areal dimensions of the excavation but that all waste sites have irregular configurations making it necessary to calculate volume by computer aided design methods.

<sup>b</sup>Nominal "Length" and "Width" are provided only as a guide to the relative configuration of the waste sites. The reference provided must be consulted for actual dimensions.

<sup>c</sup>"Affected Area" is the surface area which would be excavated assuming a 1.5:1 slope for all removal of contaminated materials.

<sup>d</sup>Depth of excavation is limited to 4.6 m (15 ft), or to the depth of the engineered structure if it extends beyond 4.6 m (15 ft).

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